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India Grid Connected Rooftop Solar Program



G-C Solar Rooftops Project – The Context

National Solar Mission launched by Government of India sets a target of 100 GW of solar PV by 2022



Low uptake in spite of Grid parity tariff in C&I segments in most of the states

- ✓ **High upfront cost**
- ✓ Lack of low cost financing
- ✓ **Lack of process streamlining**
- ✓ **Limited awareness**
- ✓ **Lack of trained manpower**
- ✓ **Consumer reluctance about using rooftops for electricity production**

G-C Rooftop Solar Project –Government's Response

- ✓ Access to international concessional lending – Sovereign Guarantee
- ✓ Promotion of Renewable Energy Service Companies
- ✓ Provision of standardized bid and power purchase agreement documentation
- ✓ Development of Unified Web Portal for process streamlining for subsidy and interconnection



Grid Connected Rooftop Solar Project – Line of Credit

The Project

- ✓ \$ 648 M (\$500 IBRD, \$125 CTF, \$23 GEF)
- ✓ Target 600 MW grid connected projects installed
- ✓ Financial intermediation through State Bank of India's, 22,000 branches
- ✓ WB product: Program for Results

Results

- ✓ Since 2017, 80 MW installed
- ✓ +575 MW approved by SBI
- ✓ USD 250 M disbursed
- ✓ USD 2.5 billion catalyzed for 3 GW of installations



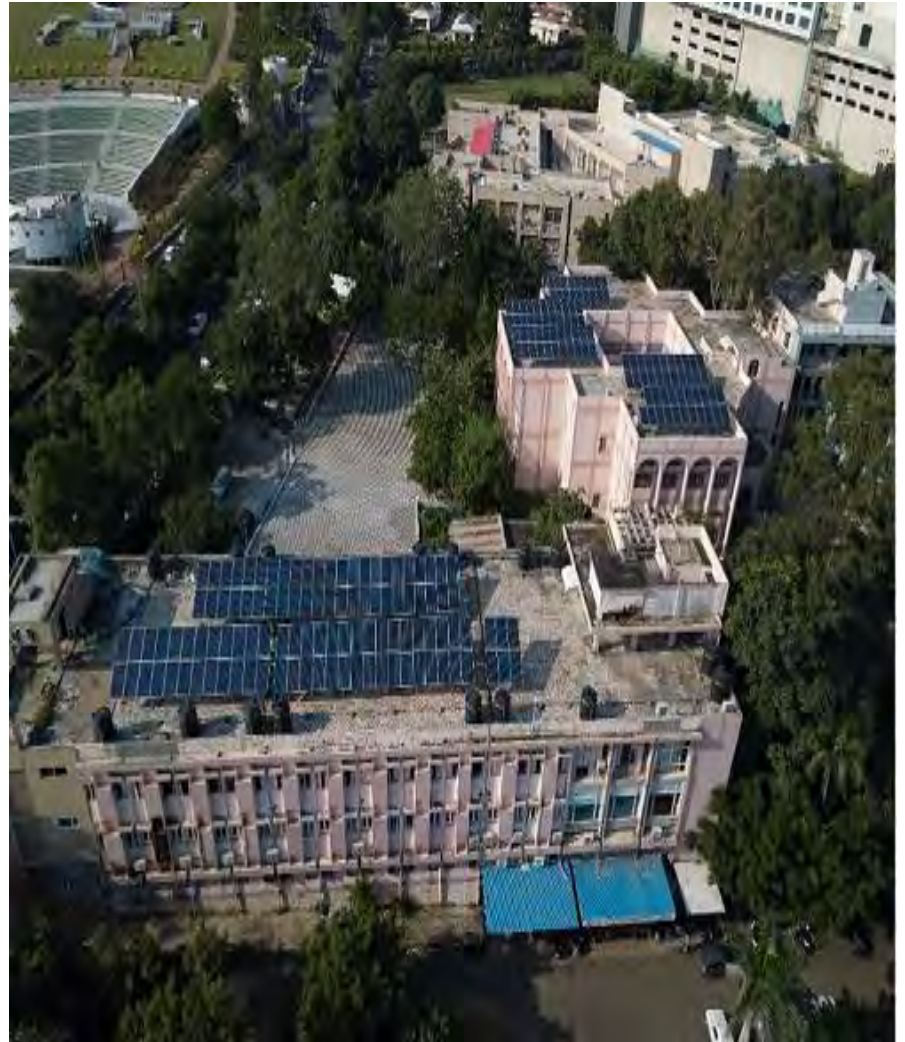
G-C Rooftop Solar Project –**Technical Assistance**

TA Program

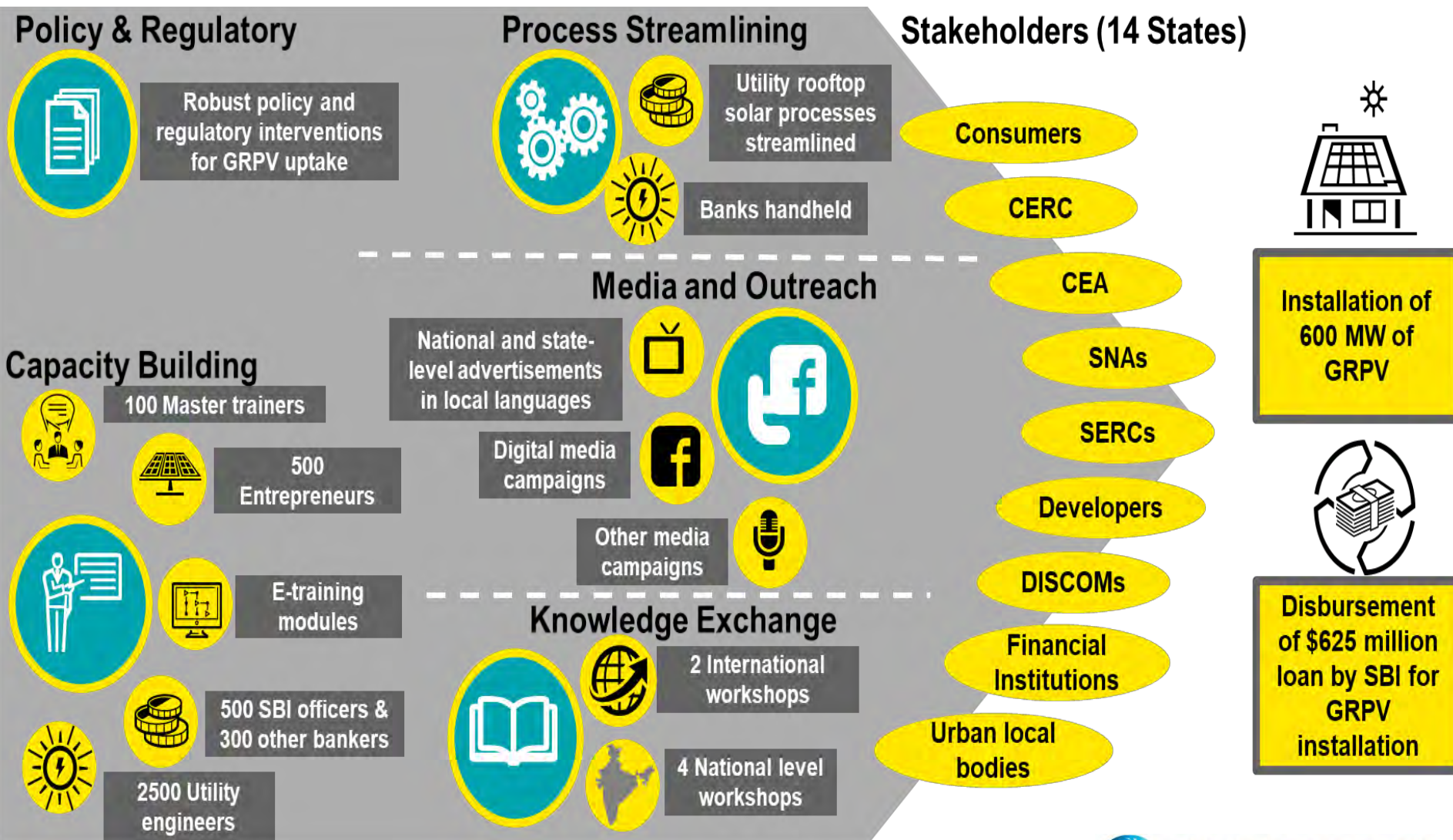
- ✓ USD 13 Mn GEF TA program for Sustainable Partnership for Rooftop Solar Acceleration in Bharat (SUPRABHA)
- ✓ USD 10 Mn first loss with SBI

Interventions

- ✓ Creation of enabling ecosystem in Indian States in the following areas :
 - ☐ Policy & Regulatory
 - ☐ Process Streamlining
 - ☐ Capacity Building
 - ☐ Media & Outreach
 - ☐ Demand Aggregation
 - ☐ Knowledge Exchange



G-C Rooftop Solar Project – Technical Assistance



G-C Rooftop Solar Project – Results

- ✓ Implemented demand aggregation and enabled Madhya Pradesh in achieving record low tariff for Government Buildings
- ✓ Completed Demand Aggregation for 11 Indian States totaling 165 MW
- ✓ Updated Model Rooftop Solar Regulation approved by Forum of Regulators
- ✓ Financing Framework developed for MSME sector for increased uptake of rooftop solar
- ✓ Trained 400 stakeholders (utility engineers and bankers) and trained 50 Trainers
- ✓ Developed Strategic Media Strategy and Outreach collaterals for Centre & States



G-C Rooftop Solar Project – Key achievements



*Indicative Solar PV array layout superimposed on Google image
at an identified location*

Problem

Information
Asymmetry

**Identify
Location**

**Assess
Potential**

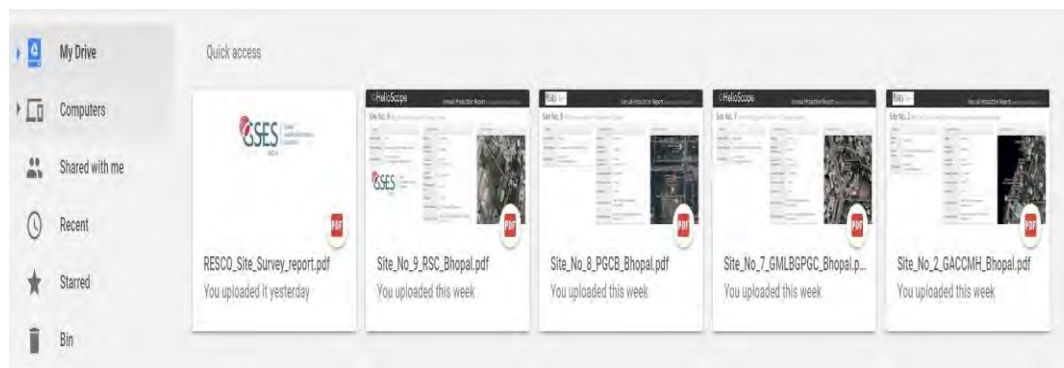
**Create
Database**



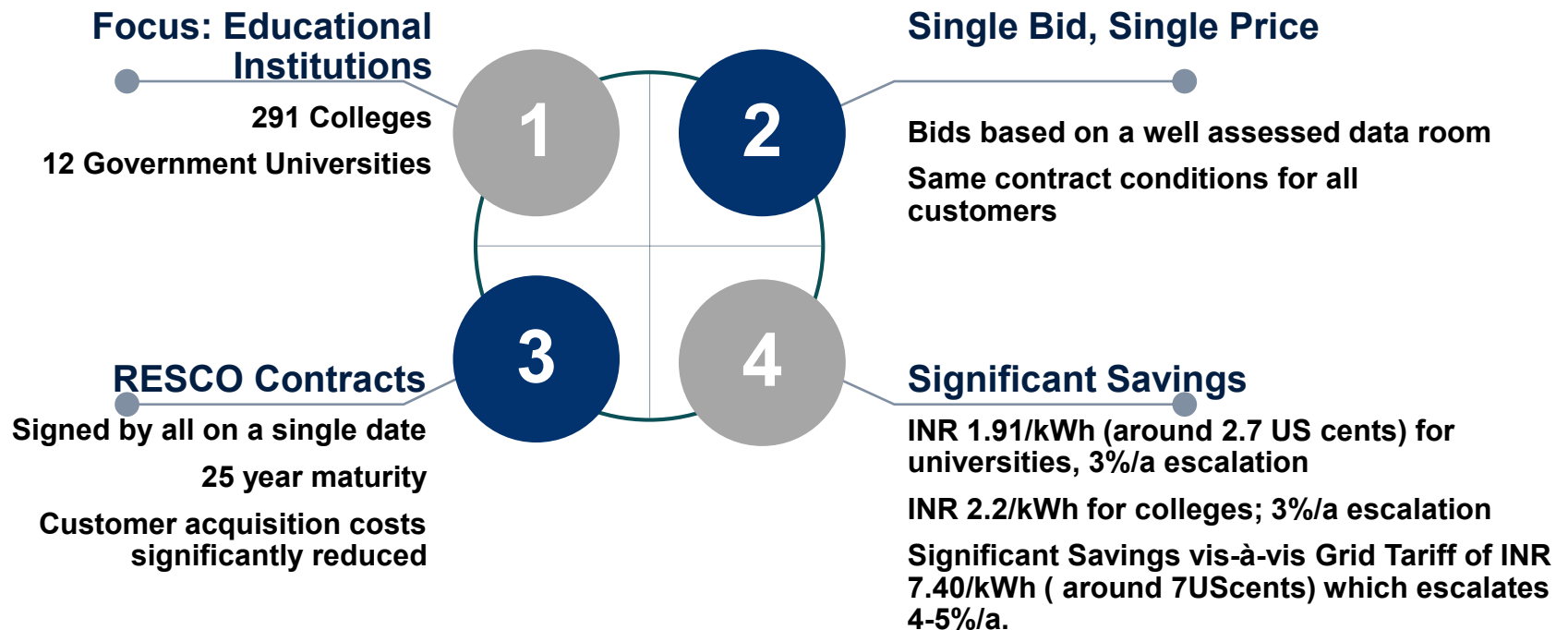
Figure 1: Google Earth image of the site with co-ordinates



Figure 3: Snaps from site survey



G-C Rooftop Solar Project – Key achievements



G-C Rooftop Solar Project – Key achievements

Development of GRPV Policies for Sikkim and Meghalaya

Objectives

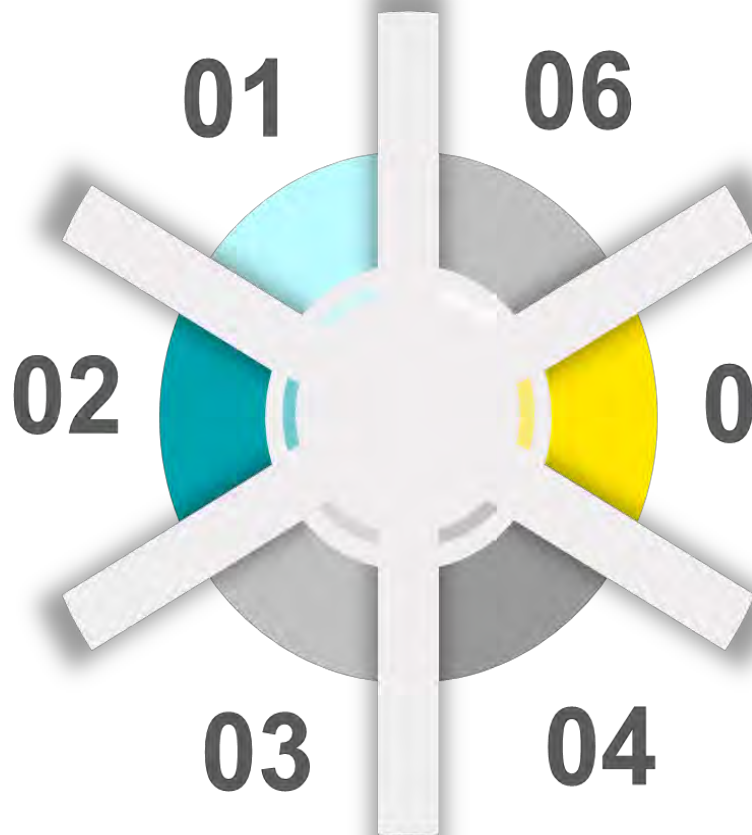
- Local Employment generation
- R&D and Manufacturing
- Capacity Building

Target Setting

- State's overall Target till 2022
- Category wise, Sector wise, Year wise Trajectory for - Domestic, Commercial, Industry, Institutions, Government Departments

Incentives

- State Level Fund
- Generation based Incentives
- Subsidy for Batteries



Operation Modes

- With / Without Battery back-up
- ToD Tariff design for promoting Peak Demand Management
- Converting Off-grid systems to GRPV

Metering Arrangements

- Gross metering
- Net Metering
- Virtual Net Metering

Best practices

- Innovative ideas/ best practices
- Utility based Business Models
 - Aggregator
 - Facilitator
 - Super RESCO
 - Online Unified Portal

G-C Rooftop Solar Project – Key achievements

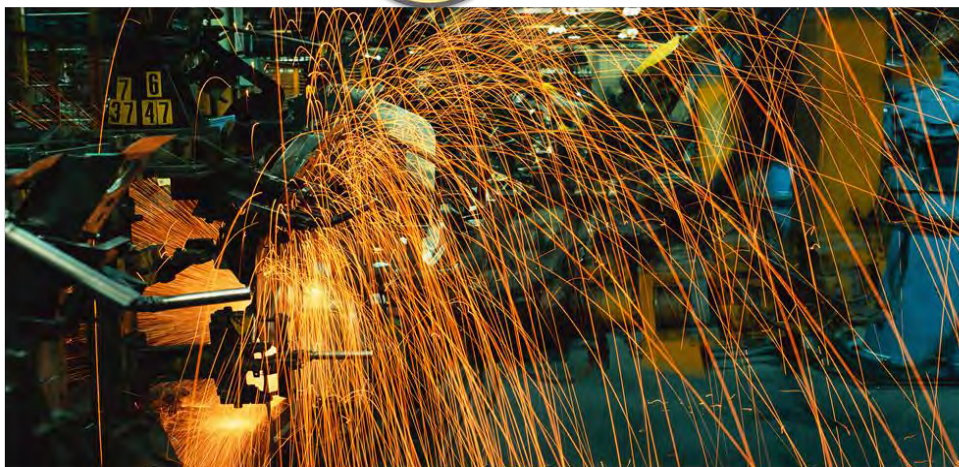
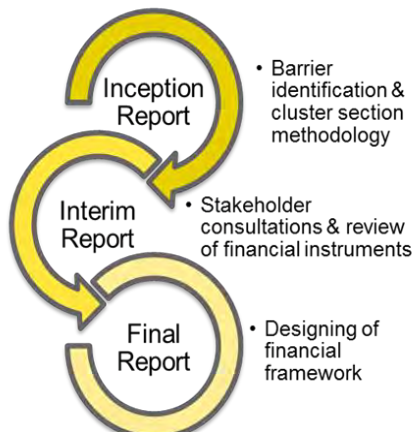
Development of comprehensive metering regulation and accounting framework for Grid connected rooftop



- ▶ **Gap Assessment Report and International Review and Business Models developed (tools developed for DISCOMs)**
- ▶ **Stakeholder meetings completed to garner insights -12 States and 28 stakeholders**
- ▶ **First Stakeholder Workshop – 16th June**
- ▶ **Updated model regulation presented to FOR on 24th Aug and 13th Nov 2018**
- ▶ **Final model regulation presented to FOR Technical Committee on 8th Oct 2018**
- ▶ **Model regulations approved by FOR on 13th Nov 2018**

G-C Rooftop Solar Project – Key achievements

Identification of barriers for rooftop solar uptake in MSMEs and developing financing instrument for MSME



- ▶ **Two SME sectors shortlisted** and 64 stakeholder* responses compiled
- ▶ **Interim Report launched at a side event on 6th Assembly of GEF** held on **26th June 2018** in Hanoi, Vietnam
- ▶ **Detailed stakeholder survey** completed
- ▶ **Financing Framework** under development
 - Consultation workshop held in July 18
- ▶ **Finalized Financing Framework** (December 2018)

*Stakeholders : Lenders, Developers and SMEs

G-C Rooftop Solar Project – Key achievements

Capacity Building Activities



- ▶ **nNEST-NET** established and **17 Institutes** selected after analysis and executed MOUs
- ▶ Trained **50 Master Trainers**
- ▶ Trained **250 SBI officials** for Solar Proposal Evaluation
- ▶ **Training Formats & Materials** for training programs developed
- ▶ **Finalized Standard Operating Procedures** for delivery of training programs
- ▶ Trained **150 Utility Engineers** in Sikkim, Meghalaya and Nagaland
- ▶ Finalized National / Statewise **Training Calendar** for various stakeholders for training programs implementation



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Thank you!

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Senior Energy Specialist
World Bank



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Innovative WBG Solar Projects in India – Annex

A UNIQUE 2-STAGE AUCTION WAS DESIGNED TO INCREASE COMPETITION: STRONG MARKET RESPONSE IN STAGE-I REDUCED TARIFF BY 10%, 33 HOUR ONLINE AUCTION REDUCED TARIFF BY ANOTHER 16%.

Green Infra Wind
Energy Ltd.
(Sembcorp,
Singapore)

SB Cleantech Seven
Ltd.
(Softbank, Japan)

Enel Green Power
Development S.R.L
(Enel, Italy)

GDF Suez Energy
India
(Engie, France)

Solenergi Power
Private Ltd.
(Ostro)

Canadian Solar
Energy Holding
Singapore 3 Pte
Limited

Hero Solar Energy Pvt
Ltd.

Renew Solar Power
Private Ltd. (owned by
Goldman Sachs c.,
Abu Dhabi Investment
Group, ADB, GEF)

Shapoorji Pallonji &
Co. Ltd.

Aditya Birla
Renewables Energy
Ltd.

Mahindra Susten Pvt.
Ltd.

Azure Power Thirty
Four Pvt. Ltd.

Acme Solar Holdings
Private Ltd.

Orange Renewable
Power Private Ltd.

Torrent Power

Rattan India Solar 5
Ltd.

AMPL Cleantech Pvt.
Ltd. (Atha Group)

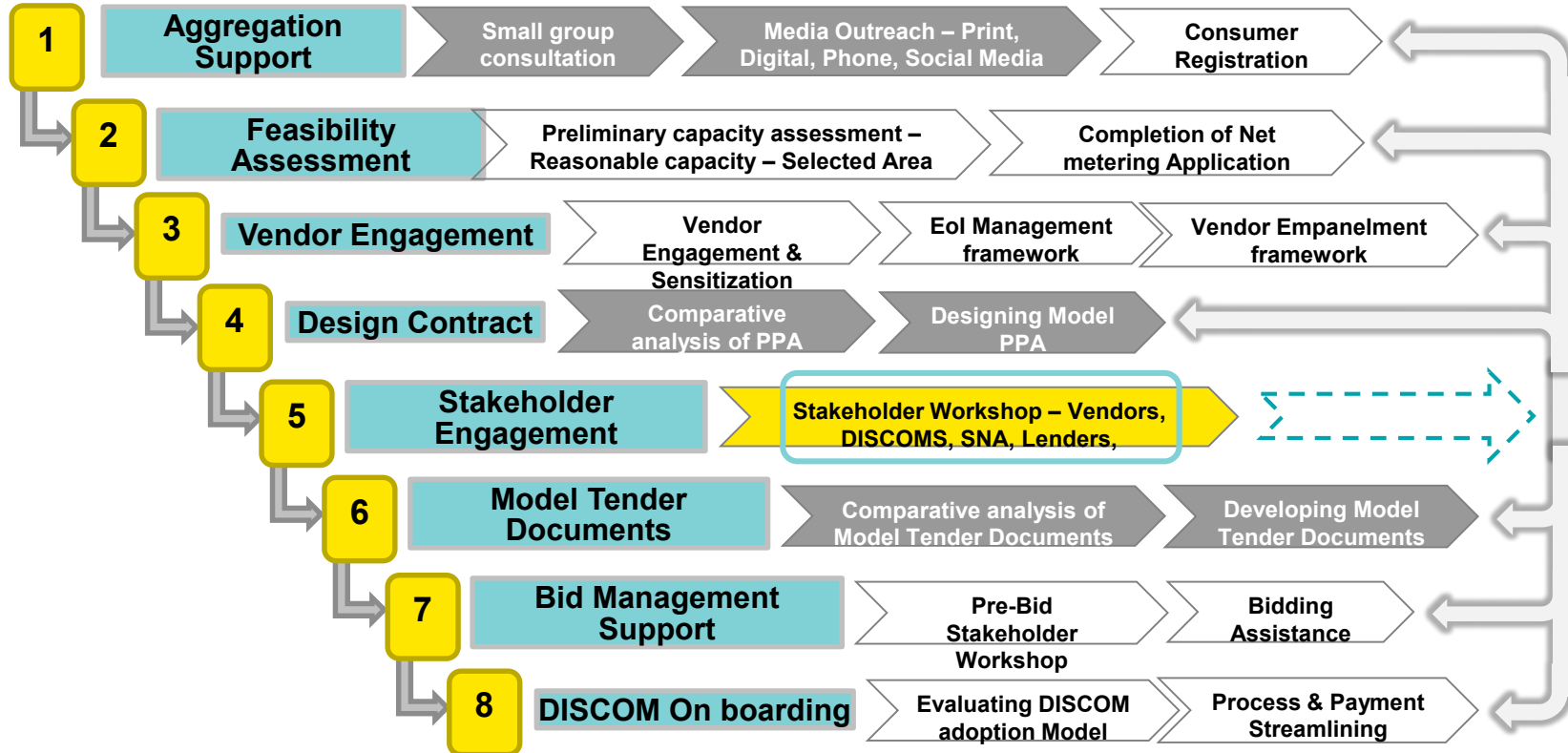
ACB (India) Ltd.

NHDC Ltd.

Rosepetal Solar
Energy Pvt. Ltd.
(Adani)

The auction, held after 5 road shows & pre-bid meetings reflected the complete buy-in by domestic and international investors and lenders.

Demand Aggregation Program – Success Story



G-C Rooftop Solar Project – World Bank's Role

Maximizing Finance for Development

